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Fig. 19. WEEPING YELLOW CYPRESS. Chamaecyparis nootkatensis pendula (Beiss) Schneid.

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THE ASSOCIATES, through whose interest and generosity The *Bulletin* and certain other undertakings of the Arboretum are made possible, is an informal group of individuals interested in encouraging and furthering the educational and research endeavors of the Morris Arboretum. Further information concerning this organization will be sent on request.

# Weeping Yellow Cypress

Among the handsomest of all evergreens at the Morris Arboretum is an eighteen foot specimen of a weeping form of the Yellow or Sitka Cypress, Chamaecyparis nootkatensis pendula, illustrated on the cover.

The type species, C. nootkatensis, is indigenous to the mixed coastal forests of the Northwest, from Prince William Sound, Alaska, south to the Cascade Mountains of Washington and Oregon almost to the California line, and while it often grows in somewhat inaccessible places for lumbering, its timber is greatly valued for decorative woodwork, fetches a high price, and has been described as "the finest of all North American coniferous woods." This tree has proved both hardy and successful in the Eastern States and, although not common, is none the less fairly frequently met with on estates and in most arboretum collections. It is essentially broad pyramidal in habit and is enjoyed for its green or grayish, finely divided foliage borne on slender ascending branches.

The subject of this note, however,—the weeping form,—is as distinct from the type in grace and attractiveness as it appears to be rare in this country. More than one weeping form has evi-

dently been recognized, for one with extremely pendulous branches was figured in *The Gardeners' Chronicle* in 1906 which seems to be quite distinct from a second form named by Beissner and introduced to England at an earlier date. This second form is said to have nearly horizontal primary branches with only the branchlets pendulous,—a description which corresponds reasonably well with the specimen at The Morris Arboretum for the weeping effect is here sufficient to impart grace without in any way approaching the grotesque. With this particular plant the primary branches happen to be ascending rather than horizontal but, be that as it may, it is an admirable tree.

Chamaecyparis nootkatensis pendula has never received winter protection at Philadelphia and has only once been injured—by an ice storm some years ago which broke its leader. Recovery, however, was rapid so that the injury is no longer apparent. This variety is normally available from a number of European nurseries but does not appear to be commercially listed in the United States.

H.T.S.

# A Wartime Retrospect

Once again THE MORRIS ARBORETUM BULLETIN resumes normal publication. The last issue (Vol. 4, No. 4) appeared in February, 1943. By that time the Arboretum, like any other enterprise, had abundantly felt the effects of war. Reductions of its staff in favor of wartime industry, research, and the armed forces was unavoidably paralleled by restriction of activities. Among the casualties was the BULLE-TIN. A three year lack of this means of contact with associates and correspondents of the Arboretum has been regretted. Both satisfaction and encouragement have been found, however, in numerous indications of the patience and continued interest of our readers, and it is to be hoped that future returns through the medium of these pages will prove this confidence to have been justified. Our thanks are especially due to the many individuals and organizations on our exchange list who have continuously maintained their contribution of periodicals, magazines and bulletins throughout this difficult period with so little return on our part.

As was to be expected, the war years saw numerous changes, temporary and permanent, and unfolded new fields of endeavor for various staff members in both the Arboretum and the Department of Botany. The first loss to the Arboretum staff occurred in 1942 when Arthur Streeper, vehicle driver, severed connections, after six years, in favor of the Atlantic Refining Company. Arthur subsequently joined the U. S. Navy and saw considerable ocean travel before securing an honorable discharge in December, 1945.

In February, 1943, Joseph W. Adams, curator of the Herbarium, turned to war industry and the Philco Corporation where he was engaged for two and a half years as machinist, making fixtures and jigs for radios and communications. During this time, however, he still maintained connection with the Arboretum and provided especially valuable week-end assistance in helping to forward the Arboretum's labelling project. He rejoined the Arboretum staff in his former capacity in November, 1945.

In April, 1943, Angus Mackenzie, gardener, after ten years of service with the Arboretum and five years with the Morris estate, turned to war industry as a master rigger in the Sun Shipyards, where he continued until May 1st.

In July ,1943, Henry T. Skinner, Curator, relinquished his duties at the Arboretum to become a Camouflage Technician in the 939th

Aviation Engineers of the United States Army. Assigned to the First Air Force, he spent many subsequent months in travelling the airfields from Florida to Maine and the Midwest, giving instruction in camouflage and demolitions to fighter and bomber crews preparing for overseas movement, and in preparing manuals and instruction material for this purpose. It seems that camouflage of a B-29 entails techniques which had been little thought of in the last war and even the knowledge of how to transplant a Pin Oak or Arborvitae was not much help in the case! With air superiority gained, the need for camouflage decreased proportionately and in 1945 Skinner transferred to the Quartermaster Corps. After four more months of service he achieved a permanent leave from the Army and was welcomed back to the Arboretum in October.

There was one further permanent loss in Mrs. Peggy Kimes, Arboretum Secretary, who resigned in December, 1943, after two years of service in order to devote full time to her increasing family.

As was to have been expected, at the Department of Botany as well as at the Arboretum, normal routines were very definitely affected during this period.

Commencing during the summer of 1942 and continuing until recently, Professor Wesley G. Hutchinson was on leave of absence to carry on work under a contract held by the Johnson Foundation with the Office of Scientific Research and Development. This work has been concerned with the study of the deterioration of military material under the conditions of the humid tropics and with methods of preventing such deterioration. In connection with these studies Dr. Hutchinson made four trips to the Central American tropical areas. Two to four men were engaged in investigation at a research testing station established in that area, while an additional five to seven conducted research at the Department of Botany where a specially constructed greenhouse chamber permitted the testing of a wide variety of army and industrial equipment under simulated tropical conditions. Results of this work, at the time confidential, were described in monthly progress reports and summarized in five bound manuscripts.

Dr. Spencer H. Davis, Jr., relinquished his duties as Assistant Pathologist at the Arboretum in 1942 to assist in the above project. His earlier studies were followed at the Arboretum and the Department of Botany, to be continued at the tropical research station at Frijoles, Panama. During a return visit last spring he married Miss Emily J. McElwee of Philadelphia who subsequently accompanied him to Panama for the remainder of the year. Dr. Davis is now engaged in fungicide research in the Department of Plant Pathology of the University of Delaware.

Three members of the Department of Botany became engaged in the rubber research program. In this connection Professor William Seifriz spent three and a half months in Haiti on research primarily concerned with the electrophoretic properties of Hevea, Castilloa and Cryptostegia latex, and a correlation of their electrical properties with coagulation and acidity. Results of these studies have appeared in the August and September (1945) issues of India Rubber World. Dr. Seifriz's sojourn in Haiti was rounded out by twelve lectures at the Medical School which, considerably augmented, are now about to be published in French under the title "La Substance Vivant" at Rio de Janeiro. Results of studies during a subsequent and shorter visit to the Government Experiment Station at Coconut Grove, Florida, were published in Science under the title "The Coagulation of Latex.

Dr. Paul J. Allen, Instructor, was granted a leave of absence in February 1943 to engage in war emergency research on new biological methods of extracting rubber from supplementary rubber plants, notably Cryptostegia and Guayule. By this time the East Indian pre-war source of well over 90 percent of our Hevea rubber was cut off. Dr. Allen was stationed first in Philadelphia at the Eastern Regional Research Laboratory of the U.S. Department of Agriculture and later at the Salinas, California, Laboratory. Dr. Allen has recently been appointed Assistant Professor of Botany of the University of Wisconsin. Dr. Robert A. Whittenberger had already left to join the staff of the Eastern Research Laboratory for work in connection with the Cryptostegia rubber program.

As at most larger institutions of learning throughout the country, the declaration of hostility was shortly followed at the University of Pennsylvania by the appearance of new groups of uniformed students accompanied by a demand upon university authorities for the prompt formulation of specialized and often entirely new programs of instruction. To Dr. John M. Fogg, Jr., Professor of Botany and from 1941 to 1944 Dean of the College of Arts and Sciences, came the responsibility for organizing and administer-

ing the Foreign Area and Language curricula for the Army Specialized Training Program.

The purpose of this curriculum was to instruct selected army trainees in the use of a foreign language, as well as to teach them a great deal about geography, natural resources, history, social, political economic and cultural institutions of the countries and peoples whose languages they were learning to speak. In addition to administering this program, Dr. Fogg also took some part in the instruction given the students. Since instruction included such unfamiliar languages as Moroccan Arabic, Hindustani, Bengali and Chinese, his own interests centered about teaching the students particular information concerning the native vegetation of such areas as French North Africa, India and China. Such instruction had to be of a somewhat practical nature since it was deemed important that the trainees learn something about agriculture and plants of economic importance. It involved explaining to them which plants were useful as food and drugs, which were poisonous and what types of vegetation might provide permanent or seasonal shelter for military purposes. It had to be borne in mind that in the case of a flier forced down in unfamiliar territory a knowledge of the natural resources might spell the difference between survival and disaster. Several hundred soldiers received instruction under this program during the two years of its duration. Dr. Fogg was appointed Vice-Provost of the University in 1944. In spite of increasing calls of an administrative nature upon his time he is glad to report that work on the new Flora of Pennsylvania still moves ahead and may shortly resume its former impetus toward completion.

During 1943 Professor Edgar T. Wherry gave a course in European Geography, and Professor Conway Zirkle one in inorganic chemistry to students in A.S.T.P. and other military personnel.

With so many members of the Department of Botany staff preoccupied with war-connected activities, unusually heavy teaching responsibilities were carried throughout the war period by Dr. Walter Steckbeck. These were further intensified by the accelerated program upon which the university operated during the war, in common with most universities.

It is with regret that we report the death in September, 1945, of Professor Irwin Boeshore at the age of sixty-two. Dr. Boeshore had been connected with the Department of Botany since 1913, first as graduate student and later as a member of the staff. He took a deep interest in the rich collection of conifers at the Arboretum and made good use of them in connection with the courses on gymnosperms which he gave periodically. His other specialized interests, also upheld in advanced courses, were the ferns and their allies, and paleobotany.

Returning to the Arboretum, it is fortunately noted that staff changes have not been entirely in the nature of temporary or permanent losses. In May, 1943, the Arboretum welcomed the services of Percy W. Adams as Propagator. Mr. Adams was formerly superintendent at the Rose Valley Nurseries at Moylan, Penna. Mr. and Mrs. Adams now occupy the Millers House at Bloomfield Farm and we hope their association with the Arboretum will be long and pleasant.

The Arboretum was also fortunate in securing the assistance of George Campbell in October, 1943. Mr. Campbell is a machinist by profession and in addition to his other duties has already given yeoman service in the design and preparation of many hundreds of wooden and stainless steel labels for the outdoor collections.

The duties of Arboretum Secretary and Librarian were assumed by Mrs. Marion Code in January, 1944, after six months service as Executive Secretary of the Philadelphia Council for Conscientious Objectors in cooperation with Civilian Public Service under Selective Service. A graduate of Radcliffe College, she is experienced in secretarial work and fortunately possesses a refreshing interest in horticulture to sustain her through the rather deserted years of the war. Often she was the only occupant of the Administration Building which now begins to hum again with the activities of many workers.

Through these same years invaluable assistance was furnished by Nathaniel Watkins and William Streeper, both old friends of the Arboretum, yet both actively engaged for the first time in caring for the rose garden, the lawns and a host of attendant plant problems.

In this way the work of the Arboretum has gone on. While any expansion of activities was impossible under the circumstances, the enduring problems of maintenance were met and solved in a way which produced results comparing very favorably with similar situations throughout the country. This was accomplished in the almost total absence of customary additional summer help, thanks to the cooperation of the entire staff including, as yet unmentioned, three veterans of many seasons of rain, heat and snow at the Arboretum,—Andrew Falkenhagen, Joseph Costanzo and James Gillette. As a war note it may be further remarked that the tasks

of John Tonkin and James O'Neill in directing this work were not lightened by the assumption of extra-curricular duties as air-raid wardens.

Besides such war cooperative efforts as have already been alluded to, a revision of normal procedures permitted participation in the Victory Garden program and production of a variety of farm and garden crops. The plowing of certain lawn and arable areas at Compton and Bloomfield Farm permitted the operation of some ten vegetable gardens by members of the Arboretum staff which have been continued into the present. In 1943 a sizeable demonstration victory garden was established under the direction of James Lambert in the vicinity of Macfarlane Hall at the Department of Botany. This garden served as a means of disseminating information to the general public and during one summer provided in addition creditable supplies of some thirty-five varieties of vegetables including 8 bushels of lettuce, 10 bushels of spinach, 250 pounds of tomatoes and 415 pounds of cabbage for the use of the University Hospital.

The wartime policy of the Arboretum in grazing cattle on the less highly developed portions of Compton and Bloomfield, in areas isolated by electric fences, had the triple purpose of lightening the burden of grass cutting, enriching the land, and supplementing the national supply of beef. This has been described in an earlier issue of *The Bulletin*. To date some 65,000 to 70,000 pounds of beef, comprising five herds of steers, have been produced by this means. A neighbor of the Arboretum, Mr. Gerald Buckler, manager of St. Joseph's Convent Farms, retains the responsibility of ownership and supervision of the cattle



Fig. 20. A wartime scene in the Arboretum.

Through the summers of 1943 through 1945 the larger lawn areas of Compton were allowed to grow to hay as a means of alleviating the mowing problem, particularly acute in the shortage of gasoline. This also served, incidentally, to supplement the wartime needs of neighboring Pennsylvania farmers.

In spite of the demands of routine maintenance, gratifying progress was made in other directions. Under the expert guidance of Thomas Carney the water mill at Bloomfield underwent a complete mechanical overhauling in order to ensure continuation of its function of pumping water for Arboretum use. This renovation included removal and overhauling of the turbine and extensive repairs to the forebay as well as construction of a new mill-race dam with the necessary gates and screens.

Great strides have been made toward the solution of the problem of plant labels. Since this has involved the development of various new techniques which may well be of general interest, a detailed discussion of labelling methods will be reserved for a subsequent issue of *The Bulletin*.

It is also gratifying to report that through the continuing efforts of Dr. Schramm, the research project concerned with the vegetation reclamation of the wastes of the Pennsylvania anthracite region has been continued to the point where significant conclusions can now be drawn. The research has been conducted largely in the southern Pennsylvania anthracite region with the cooperation of the Philadelphia and Reading Coal and Iron Company, the State Department of Forests and Waters, and the U. S. Soil Conservation Service. On a basis of information secured through these experiments the Arboretum has been called upon in an advisory capacity in connection with pending legislation regarding the forestation of these wastes in Pennsylvania. It is expected that a part of the results of this work will shortly be published.

One further new development should be recorded. Since November, 1942, the Arboretum has provided office space and necessary facilities for a permanent tree nursery at Bloomfield Farm to further research in forest genetics in cooperation with the Northeastern Forest Experiment Station which has its headquarters in Philadelphia. This work is being carried on under the direction of Dr. Ernst J. Schreiner who also has charge of the Forest Research Sta-

tion at Beltsville, Maryland. Fuller reference to this important project will be made in a later issue of *The Bulletin*.

In the library the war years were quiet but punctuated by a variety of demands for service. 'Can you show me a picture of a Judas tree? I am an illustrator doing a child's alphabet book and need a Judas tree for J." "Where can I buy a Hottentot Fig?" "What shall I use for a hedge?" From our index of over 100 subjects from acidity hybridization through pollen allergy to wounds in trees we are able to furnish reference reading to neighboring garden lovers, and from the pamphlet collection answer such questions from a patient in the Naval Hospital as "What shall I do for a repellent for deer on apple trees when I get back to my fruit farm?" On rainy days children sometimes beg for "Frontiers" or flower pictures. Students from the Dept. of Botany want materia medica if they are pre-vets. All sorts of questions,—and as the staff members return, the information service will become more prompt and authoritative.

Throughout the period covered by this summary the Arboretum has continued in its function as a welcomed place for both the education and relaxation of the general public. As a commentary, the advent of gasoline rationing brought contacts with a host of new visitors many of whom frankly admitted that they had not formerly realized that such trees and gardens existed in their midst. Numerous wounded service men from the nearby convalescent Rest House on Meadowbrook Lane have found pleasure and re-creation in frequent leisurely visits to our pleasant acres.

In conclusion, and since the above notes were written, the Arboretum is pleased to report the addition of another new member to the staff. As of January 1st, 1946, Margaret Anne Lancaster has assumed charge of the multiplying problems of plant location and landscape planning. Miss Lancaster, AB Wellesley, BS in Horticulture, Cornell, has had extensive practice in horticulture and landscape design at the Shipley Nursery, Towson, Maryland, the Flower Hill Nurseries at Ambler, Penna., and in the landscape offices of Fletcher Steele in Boston, Mass. She comes immediately from war industrial service with the I.T.E. Circuit Breaker Co. and the Electric Storage Battery Co. of Philadelphia. Miss Lancaster has a big job ahead but she is well qualified to handle it, and we wish her every success.

# Notes from the Laboratory

# Transplanting Depth for Red Pine

It is recognized that in the transplanting of any tree or shrub the more closely the former environment is simulated, the better the survival possibilities of the transplant. This note serves to call attention to the results of "too-deep"

planting of red pine.

Several summers ago we had called to our attention a row of red pine on a local estate. In the original planting a row of forty young trees had been set up, but after some eight or ten years the close growing of these trees necessitated the removal of alternate individuals. The trees removed at this time had been dug up and replanted immediately in a continuous line with the originals. The first summer after transplanting all trees appeared to be in equally good health. The second summer the twenty moved trees showed signs of active degeneration. When brought to our attention the third summer after transplanting, each tree showed limited growth of current season wood, and all stages of aborted

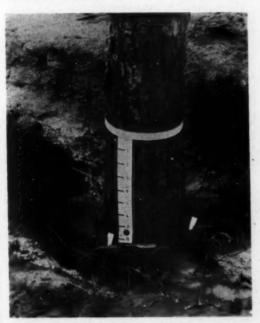


Fig. 22. Root crown of one of the excavated red pines, showing the soil line before uncovering, the depth to the original soil line prior to planting-out in this location, and the two early stages of girdling roots.

needle growth and yellowing and dying of tips. Excavating the root crown disclosed the fact that these trees had been planted from six to ten inches too deep. In some cases the stubs of the lower whorls of branches were under the ground.

The case histories of two specimens at the Arboretum which illustrate a situation similar to the foregoing are here presented. In the fall of 1936 two small trees of red pine were planted on the hillside just south of the Meadowbrook entrance. This part of the Arboretum has been designated the "pinetum" because of its environment suitable for conifer plantings. At the time of planting, the two red pines were about ten years old. Growth progressed well, and in the summer of 1938 the trees were considered to be in good condition and continued so through 1940. Early in the summer of 1941, following a spring which is remembered for its drastic effects on so many rhododendrons, signs of trouble were evidenced by retarded growth and dying of the tips of the two red pines. Late in July part of the root systems were excavated by washing. The trees were found to have been planted about eight inches below their former soil line. The root area from the trunk out to about three feet was a good fibrous appearing mass, but on examination it proved to be very poor in mycorhizal rootlets. This mass was almost entirely below the six inch depth. The outer portions of the roots, from three to seven feet from the trunk, were much less in quantity, but were nearer to the surface and had a fair portion of good mycorhizal rootlets.

By mid-September, symptoms were greatly intensified. Necrotic areas were prevalent in the trunk—from which no pathogenic organisms could be isolated. Many of the lower branches had died and had been removed. About seventy-five percent of the tips were dead and those living were aborted. The leaders had put on only about six inches of current season's growth,—in comparison to fifteen or eighteen inches in previous years. Soon after this the trees were re-

moved

It is quite probable that the same unusual weather condition in the early spring which caused the demise of the rhododendrons was a direct factor involved in the case of these pines. The fact that other young trees in this immediate locality were not affected vindicates the soil conditions in general. The fact that other red pines,—older and younger,—in the same area remained in good health reduces the probability that it

was a specific reaction. We know that in general the soil aeration is best in the upper horizon. We know, too, that the soil micro-organisms which are usually found in the upper horizon need oxygen. And finally we know that some of these micro-organisms are needed for the well-being of the tree in what we call the mycorhizal complex. Therefore when the roots are placed too deep in transplanting the normal mycorhizal complex can be neither maintained nor built up. Thus the tree becomes weakened and falls a victim to such climatic disturbances as were experienced in the spring of 1941.

Figure 22, in addition to showing the depth of planting, demonstrates what may occur if the roots are not properly laid out at the time of transplanting. The two white pointers mark the early stages of girdling roots. In later years, had this tree survived, the growth of these roots might well have caused the strangulation of the

parts they are now encircling.

SPENCER H. DAVIS, IR.

### Seed Release In Atlas Cedar

Figure 21 illustrates a phenomenon of rather unusual interest which was observed for the first time at the Morris Arboretum in 1943.—the natural seed shedding of Cedrus atlantica. The production of cones by any one of the true cedars (Cedrus libani, atlantica or Deodara is scarcely a common sight in the United States for trees must apparently approach the age of 40 years or more before they bear at all heavily; then again the cones normally require two to three years to ripen before suddenly shattering under the influence of rather special weather conditions. Two trees have fruited at the Morris Arboretum for several years, but too numerous squirrels, among their other depredations, seldom permit the cones to remain long enough to

become fully ripe.

The cones illustrated developed from flowers which were pollinated during the Fall of 1940. At first purplish in color, they became an attractive grey green and attained about two thirds of their normal size during the summer of 1941. Growth was completed during 1942 and towards the end of the year they became brownish but were still hard and remained very firmly attached. The weather was continuously dull and cold during much of December 1942 and early January, 1943, but a brief warmer period, accompanied by light rains alternating with bright sunlight, commenced Jan. 12. By Jan. 14 the ground beneath the largest Cedrus atlantica was covered with scales and seeds. The stiff, woody scales had suddenly loosened so that the cones shattered at a touch, to leave only their hard



Fig. 21. Seeds and partially shattered cones of Cedrus atlantica.

central axes attached, candle like, to the branches. Abundant large seeds from the central third of each cone contained nine or ten well-developed cotyledons, and such seeds, sown in the greenhouse a few days later, showed excellent germination within a month. During 1945 cones were borne on Cedrus atlantica as well as on the varieties aurea and glauca. This year the cones shattered a full month earlier,the second week in December. At this time, in May, abundant seedlings are showing beneath the tree.

It has been generally observed that the Deodar requires about the same time to ripen its fruits as the species described, whereas the Cedar of Lebanon takes from nine months to a year longer. Cones of all three species remain very hard if gathered and dried before they are fully mature. In this condition those of C. libani are especially difficult to open. To obtain seeds from such cones Loudon's suggestion\* of half a century ago is still worth following-store the cones for some time after gathering (up to a year will not be harmful to the seed), then soak them for a day or two in water, after which they can be split apart by driving a conical spike through the axis. It is not easy to obtain whole seeds by attempting to break them in a dry condition.

HENRY T. SKINNER.

<sup>\*</sup> J. C. Loudon. TREES AND SHRUBS OF GREAT BRITAIN. London, 1883, p. 1059.

